Breeding Herds Do Well On Sewage Supplement

Animal scientists at New Mexico State University have demonstrated that municipal sewage can be converted into beefsteak and lamb chops—by feeding dried sewage solids to breeding herds of cattle and sheep.

Researchers have known for more than 100 years that a feed product could be developed from nutrient-rich sewage, but they have not known how much of a problem might be caused by pathogens, heavy metals or toxic contaminants in sewage.

"Our data show that it is possible to develop sewage products that can be used effectively and safely as supplemental feeds for livestock," said Dr. Stan Smith, animal nutritionist at NMSU.

According to Smith, seven years of intensive investigation at NMSU show that the nutritive value of dried solids from primary domestic sewage sludge is about half the value of cottonseed meal on a dry matter basis.

When sewage sludge was fed at levels of 20 percent of total diet or less to mother cows during three or four months each year for five years, or as 7 percent of total diet to breeding ewes continuously for four years, the products tested at NMSU caused no evidence of toxicity, he said.

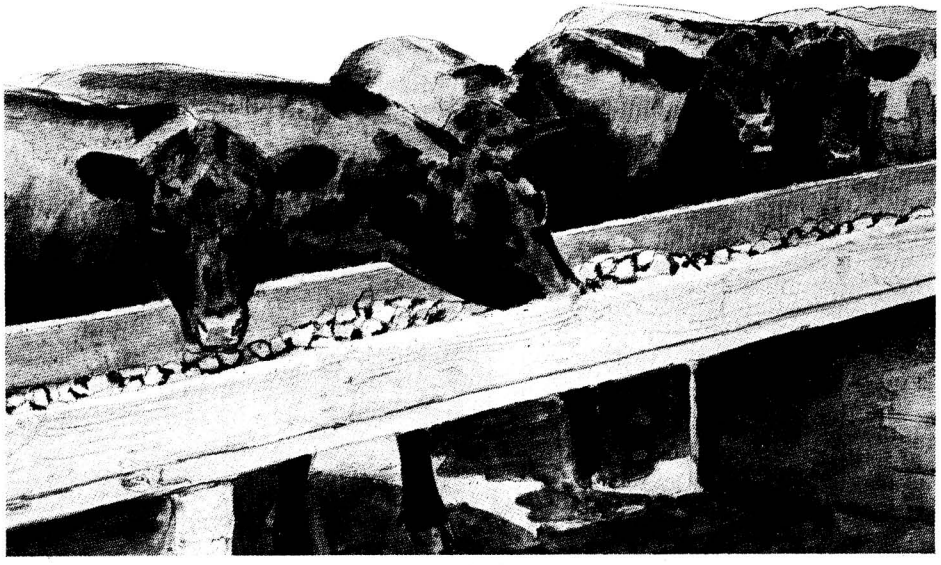
The sewage sludge used by Smith, and Drs. Herman Kiesling and Dennis Hallford, NMSU animal scientists, were collected from Las Cruces, N.M., and gamma-irradiated with a radioactive waste isotope at Sandia National Laboratories in Albuquerque, N.M. The irradiation process reduced pathogens in sewage sludge to low levels.

"Our results show nutritious feed products can be produced from carefully selected sewages without undue risk of pathigens or toxicants."

"The sludges we studied were low in toxicants in comparison with industrial sludges. Furthermore, they were unlike the 'digested sludges' typically produced by most cities," Smith explained. "But, they represent typical 'domestic sludges' that are available in most cities."

The researchers began their studies by chemically analyzing sewage sludges and feeding them to microbes in test tubes. Later, they fed sludges to rats to see if the sludges were toxic to a host animal. Finally, they began studying the responses of sheep and cattle to diets containing sewage solids.

Sheep and cattle were chosen for sewage studies because ruminant animals can ferment sludge with anaerobic bacteria in their forestomachs in much the same manner as do microbes in a sewage treatment plant. This process protects against gastrointestinal absorption of many organic toxicants and even some heavy metals that might be in sewage solids, according to Smith.



"We can't draw conclusions about all sludges everywhere, but we've checked carefully for toxicants in our experiments," the scientist said. "Our results show nutritious feed products can be produced from carefully selected sewages without undue risk of pathogens or toxicants."

"In addition, feeding these products to ruminants and to breeding herds rather than to animals being finished for slaughter should further reduce any risks to the food chain," he added.

Researchers started range cattle studies with a pelleted supplement of two-thirds sewage product and one-third conventional ingredients, but later reduced the content of sewage products. Subsequent pellets contained about one-half sewage product and one-half conventional ingredients.

One group of range cows received supplemental sewage solids only during late pregnancy and early lactation, a time when they need more protein. Another group was given a cottonseed meal supplement and a third group had no supplement.

"In four of five years, we saw signs of improved reproductive performance in cattle as a result of supplemental diets," Smith said. "The experimental supplement with sewage solids was about equal to the control, cottonseed meal, in providing protein supplement for cattle."

Extensive studies of carcass quality and composition of organs, tissues and samples of meat have been conducted in cooperation with Dr. Earl Ray, NMSU meats scientist. These studies have detected slight increases in certain heavy metals only when cattle or sheep were fed impractically high levels of sewage products. Even then, the metals accumulated mostly in kidneys or bone.

Beef from steers fed sewage solids was fed to rats studied through three generations without evidence of toxicants.

Hallford started a study with a flock of 150 ewes in the fall of 1979. One group of sheep received 7 percent sewage product year-round, another group received 3.5 percent cottonseed meal and a third group had only the basal diet which was slightly deficient in protein.

The ewes were fed sewage products through four reproductive cycles. According to Hallford, there have been no indications of adverse effects on reproduction that could be attributed to sewage solids.

"The experimental supplement with sewage solids was about equal to the control, cottonseed meal, in providing protein supplement for cattle."

He followed the sheep from conception to slaughter, looking at such factors as hormones, tissue and blood serum profiles, nitrogen retention and lamb performance, both production and weight.

"It appears that a diet containing 7 percent sewage solids may not be adequate for growing out ewe lambs destined to go to a breeding herd, however, sewage offers promise for maintaining weight on mature ewes. Also, castrated males have grown well on a diet containing 7 percent sewage solids," he said.

Smith took some of the sheep to the University of Kansas in 1982 and completed an array of tests with their livers in an effort to detect toxicants. Examination of livers from control sheep and livers from experimental feed sheep yielded results that did not differ. AJ